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AUTHOR Belcher, Duane M.; Smith, Stephen D.
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ABSTRACT

PSYCOM is a unique mixed media package which combines high interest projects on the computer with a written text of expository material. It goes beyond most computer-assisted instruction which emphasizes drill and practice and testing of knowledge. A project might consist of a simulation or an actual experiment, or it might be a demonstration, a psychological test, a questionnaire, a survey, or a poll. All projects are run on the computer. Through using PSYCOM, relatively unsophisticated students can collect, analyze, and discuss the data within the context of science. The details of computer programming, experimental design, and statistics are submerged, and the psychology student has a chance to learn first hand about psychological processes with maximum involvement. Selected project applications using PSYCOM are described, including: (1) an extra-sensory perception (ESP) experiment in precognition; (2) a poll on the 55 mile-per-hour speed limit; (3) "The Strategy Game," which examines the effect of the internal-external attitude dimension on the use of available information for forming a strategy; and (4) "Learning a Novel Task," which examines issues related to the rate of knowledge acquisition. (GL)

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PSYCHOLOGY ON COMPUTERS: SIMULATIONS, EXPERIMENTS AND PROJECTS

by Duane M. Belcher and Stephen D. Smith
Bakersfield College

Psychology on Computer.

PSYCOM is a unique package (mixed media) which combines high interest projects on the computer with a written text of expository material. We think that it goes beyond most of the CAI (computer-assisted instruction) which emphasizes "drill and practice" and testing of knowledge. A project might consist of a simulation or an actual experiment, or it might be a demonstration, a psychological test, a questionnaire, a survey or a poll.

One of the projects on the sample disk is an ESP experiment in Precognition. We used this project with some degree of trepidation because we know how skeptical psychologists and other scientists are in general toward the claims of parapsychology. But, this project will serve to illustrate our general approach. Precognition, if it exists, is knowing about something before it has happened (and without sensory information). ESP is something that many students believe in, although that faith is not shared by most professional psychologists. Students run the experiment for themselves. There is also an opportunity for students to collect data from roommates, friends, and relatives. We think both students and instructors find this project to be instructive.

Instructor role.

After students have finished a project, the instructor can collect all their disks, copy off the results of their experiment (which has been collected automatically in a file), run some additional statistics, and report to the class how it has done overall. We grade the students on knowledge of the projects, and look over their data sheets. After these sheets are returned to them, we discuss the unit in class. The group statistics are available by that time. The ESP results are in by the time we are dealing with Perception, and we have already talked of scientific method. (So far, about 4/5 of naive students believe in ESP before doing this project. Our results so far have been negative.) Should any genuine ESP turn up, suggestions for further testing of it are made. The instructor could also forgo use of automatic data collection and depend on the written data sheets. The programs will run without a data disk.

Teaching value.

There are many problems of method, design and statistics in conducting a useful and valid experiment. In the printed part of the material about Precognition we discuss a myriad of potential "traps" that the experimenter in extrasensory perception may fall into. Students should become aware of the importance of planning out an experiment carefully. They must begin to attend to the details before they

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can really appreciate science and discover the difference between fact and fancy.

The text.

The text includes worksheets for the demonstrations, experiments, and simulations, readings on the issues, statistical and experimental perspectives on the projects, and various other useful materials. In some cases we compare statistically the student data generated in the projects to data from the published literature.

In relation to the Precognition experiment, material both critical and supporting of parapsychology is presented in the written text. After student data on disk has been analyzed statistically, it can be compared to published data. It should be possible to make some tentative conclusions about whether "our class and our instructor" found any "suspected ESP." (So far, our students seem to be operating at the chance level.) We hope that the student will take a critical look at parapsychology. More importantly, we want the student to think about the whole process of scientific experimentation. We want the student to develop an understanding of how we arrive at "the facts" of science, and how slippery facts can be. It turns out that ESP is very elusive.

Other Projects.

One of the things the computer does best is to collect data for later use by the instructor. If he or she is planning to store data electronically, some of the projects will be of more interest than others. The "Poll on 55", for example, is a group project which asks students poll questions about the speed limit, but also directs them to take a real "outside" random sample poll by telephone on the issue. They also do some time samples of actual behavior, bearing on the issue of congruence between attitude and behavior. These activities require a constant interaction between reading text, use of computer to generate a random sample, conducting a telephone poll, and making behavioral time samples. Control of student activities is passed back and forth several times between text and computer program. Two visits to the computer must be made before the project is completed and all the data recorded. The text also discusses some important ideas about sampling in polls, polling methodology, and the results of several commercial polls on the subject.

Some of the projects concentrate on only a fraction of the actual data available. "The Strategy Game", for example, examines the Internal-External attitude dimension in the context of a game. The experimental hypothesis is that internals make use of information available for forming a strategy better than do externals (a well-documented finding). Winning the game is another matter. In our sample, the externals got higher game point totals than did the internals. However, more of our internals were frustrated by their performance and came back after the first game to try again. Those who did that did very well on the second go-around.

In the "Learning a Novel Task" project, several plausible measures of learning are taken. The task is much like the Digit/Symbol task in the WAIS intelligence test, which is a timed test. This task produces nice learning curves. Sometimes, however, the individual results are more interesting than the group results. We ran one subject out on the task to see if his measures of learning (speed of substitution) could be improved beyond that shown at the point of mastery. Additional trials beyond mastery provided continuous (nearly straight line) improvement in scores! We never did find out what his limit was because we had to discontinue testing at twenty trials. The role of timed tasks in intelligence testing may be worthy of further examination.

The Novel Task project also has many implications for class discussions of the Great IQ Controversy, sparked by Arthur Jensen. Jensen has seemed to mistake IQ for intelligence, neglecting Wechsler's admonition that a significant part of the variance on IQ tests is non-intellective in nature (personality and temperament based).

Computer involvement.

The projects are run on the computer. The programs, and the files which are created by the students running the program, are kept on disk. Since the computer can keep track of time very accurately, we time a number of tasks. In an experiment on memory and perception we present stimuli for about 1/20 of a second on the screen. In another task we measure reading speed unobtrusively. We give a number of tests of psychological variables, score them, and feed back the results.

It seems hardly necessary to point out that the use of the computer to control the presentation of a project minimizes many problems involved in data collection. It is possible to "trap" for error and implausible input and ask a question again. It is particularly important that results from student data files are created automatically, guarding against simple error. The introductory student and the instructor do not need to be overly concerned with these details.

Disk vs. Text Control.

Sometimes the direction of control of the student's progress in the project is by disk, and sometimes it is reversed and passed to the written material. Perhaps there are tasks to be performed, such as to read a passage or prepare a list, or data to be collected before the student may resume interacting with the computer.

The package is at the moment unique in the way in which it combines computer controlled projects with expository material. We can take a relatively unsophisticated student into a project, collect data, analyze it, and discuss it within the context of science. And we can do this before he or she has gone very far into psychology. The details of computer programming, experimental design, and statistics are submerged, and the psychology student has a chance to learn at first hand about psychological processes with maximum involvement.

The student learns so much more by doing it himself or herself. The most difficult parts of design and statistics are not really the focus of this work. We bring some of these concerns to the students attention, but real mastery of such techniques must await more advanced courses. Here we are content with a more limited goal. We want to teach an appreciation for science and the process by which science obtains its facts and theories. All the other research which the student reads about should seem more relevant.

Some of the projects have relevance to popular beliefs and biases. The student might, for example, go away from our ESP experiment with a personal understanding of why most psychologists and other scientists remain skeptical about parapsychology.

We think that this package of text/disk will find its place in the introductory psychology course as a supplement. This package will probably be adopted by those instructors who personally think that research can be exciting, who want to get their students involved with psychology, and who see the projects as a way to get them started. Microcomputers are very "hot" right now and many instructors are eager to find ways to use them in instruction. This could be the "new relevance."

We think that there is evidence of a tremendous interest developing for serious educational materials (courseware) which tap the potential of the computer.

You may wonder why we have proposed a hybrid product, a combination of printed material and computer disk. Books are not obsolete and authors will continue to write them. After working with the idea for a some time, we see that there are many justifications for such a combination. Sometimes data needs to be collected over time and entered into the computer only when complete. Some of the projects depend on summing data from many individuals and having the instructor collect and analyze it before feedback is given the student. The student may want to review several times the research summarized in the written materials prior to being tested on it.

We think that material like this project will appear soon for many fields. There is no doubt in our minds that much if not most real psychological experimentation will soon be conducted interactively on microcomputer—if the research possibility can be adapted at all to computer presentation. It will not take long for instructors to want to bring that all to the instructional process itself.

Flexibility and friendly.

One of our goals with PSYCOM was to provide a flexible set of projects which could be used as the instructor desired. It is not a canned course. It is not meant to replace anything in the basic course. It has been designed to be economical of the student's time on the computer and user friendly. Most projects can be completed by the student with less than 30 minutes on the computer. The book

includes a glossary, bibliography, references, and appendices. We include as supplement some objective, multiple-choice questions on the material. Some tools for data transfer into various statistical programs are included.